NEWS SCIENCE NEWS

— ATMOSPHERIC ENERGY —
HARNESSING THE 'POWERS' OF THE ATMOSPHERE

by Anthony M. Hansen

Since early times mankind has had a constant and reliable source of power in the form of the wind. Man was quick to find ingenious but simple applications for this force of nature. Obvious examples are the sail and the windmill. What is not so obvious are the underlying principles, as defined in physics books; to be more specific, the principles of thermodynamics.

Thermodynamics is connected with heat; that is to say, measurement of heat, and laws relating to the conversion of heat into mechanical work. Nature gives a wonderful example in the movement of the wind. The atmosphere basically moves because over the land, for example, the temperature can be higher than over the ocean, with the result that the hot air rises over the land and the cooler air flows in to take its place.

In thermodynamics, the terms T_1 and T_2 are frequently quoted. T_1 usually refers to a specific temperature and T_2 refers to a temperature which is less than T_1. Otherwise expressed, the bigger the temperature difference, the more energy there is available. Applying this to the movement of the wind, if the atmospheric temperature of the Earth were the same everywhere, presumably there would be no winds.

One of the earliest attempts to harness the power of the atmosphere, apart from using the windmill and the sail, was attempted successfully by Newcomen, a Dartmouth blacksmith, and patented in 1705. The device consisted of a vertical cylinder and a piston which was connected to a horizontal beam. The other end of the beam was connected to the piston of a pump. The weight of this side of the beam was sufficient to draw the piston to the top of the cylinder. Steam was admitted from a boiler through a valve to the cylinder. When the supply of steam was turned off and some water injected into the cylinder, the result was that the steam condensed, forming a partial vacuum inside the cylinder. The pressure of the atmosphere acting on the top half of the piston forced it down. By continually repeating this process, a powerful machine was put to work pumping water.

In 1827, Robert Stirling took out his patent for a hot air engine which used the heat of the air. From the very start, the hot air engine offered an irresistible fascination for the inventor because even the crudest attempts with it always resulted in an efficiency far superior to that of the steam engine. This is readily explained as being due to the far greater temperature range possible working with air than is possible with steam. This is because the efficiency of an engine depends upon the limits of temperature to which the working fluid is subjected. It is practical to use a higher working temperature with air than with steam because there is no fixed relation between the pressure and temperature of air, such as exists in the case of steam.

PUTTING COMPRESSED AIR TO WORK

Having reviewed at some length the various forms of machinery available, I decided as a starting point that the windmill took a lot of beating as far as reliability and power were concerned. For example, it is quite easy to obtain six to 10 horsepower from the wind.

It is obvious that power, or the rate at which work is done, has nothing to do with the quantity of work accomplished. A very slow rate may accomplish a great deal of work, if it only keeps at it long enough, while a very high rate may be represented by a very small quantity of work, provided it be expended in a sufficiently short space of time. Thus, a windmill of only a few horsepower, compressing air by working steadily day and night for weeks and months, may compress millions of cubic feet of air and thereby perform a vast amount of work.

The air which is compressed by the windmill is stored in suitably large pressure vessels or compressed air tanks. To give an idea of size, an LP gas tank similar to the ones used in service stations is ideal. These can be pumped up to a pressure of 200 to 300 psi. This represents a considerable amount of energy stored in a pressure vessel in the form of compressed air.

A convenient way to use this compressed air is to use the pressure of the air to move a piston in a cylinder, preferably in alternate directions. This reciprocating force moves a conductor through a magnetic field, thus generating electricity. If, for example, a piston had five square inches of surface area and a pressure of 100 psi were applied to it, we would obviously have a piston in a cylinder with 500 pounds of push. In such a case, the load from the conductor going through the magnetic field ideally should be about 400 pounds resistance.

When the conditions are similar to this, the air has no choice but to give up the heat

A Dynamic Linear Mass Accelerator (DLMA Linear Engine) working prototype, producing 250 volts at 50 hertz.

it contains and thus turn heat into mechanical work. This results in the air becoming very cold. The degree of coldness is directly proportional to the applied force and the resistance it encounters. In other words, the heavier the load, the colder the temperature.

THIRD LAW OF THERMODYNAMICS

The third law of thermodynamics states that there are four essential conditions necessary for a heat engine to work. This applies to internal combustion engines such as LP gas, petrol, diesel, steam or compressed air. These conditions are:

1) There must be a source of heat. As an example, with internal combustion engines the source of heat is the burning of fuels such as LP gas or petrol. This heat is applied to the compressed air in the cylinder at the moment of ignition. The heat of combustion causes the compressed air molecules—already at a pressure, which may be from 150 to 300 psi—to vibrate more intensely, thus increasing the pressure which is applied to the piston face. The heat energy can now be turned into mechanical work.

2) There must be a temperature difference in the process. As an example, the temperature of combustion may be 700° to 900° Fahrenheit (371° to 482° Celsius) while the temperature of the atmosphere may be 70°F (21°C). This is represented in thermodynamic terms as T_1 and T_2—here, T_1 being 700° to 900°F and T_2 being 70°F. It can thus be seen that, with such a large temperature difference, a considerable amount of power can be developed.

3) There must be a carrier of the heat energy. This basically means that the air is a medium which carries the heat, just like a bucket can carry water.

4) There must be a method or means of turning heat into mechanical work. In this case it is the familiar piston in the cylinder, examples of which have been given in the previous essential conditions.

THE THIRD LAW APPLIED TO COMPRESSED AIR ENGINES

Applying the above conditions of the third law to compressed air engines, if a piston is driven by compressed air at 200 psi through a quarter of its stroke and then the air supply is cut off, and if the piston has to do work, it is quite easy to attain temperatures in the exhaust of minus 50°F.

This relates to T_2 in the temperature difference scale, T_1 being the temperature of the atmosphere—let's say, 70°F. It can now be seen that a considerable temperature difference exists—120°F in this case. This conforms with the second essential condition of the third law.

Having established the temperature difference, it is now necessary to feed in the heat from the atmosphere. As the atmospheric air contains the heat (condition 3), if the engine has heat exchanger fins, and if they be of suitable size, heat from the atmosphere will flow into the engine and, by doing so, should be turned into mechanical work, thus adding to the efficiency of the machine.


The MKII working prototype of the DLMA Linear Engine.

IMPROVING ENGINE EFFICIENCY

Otto was the first to develop the four-stroke cycle and was also one of the first to propose using a so-called free piston engine running on fuel.

Some years later, in 1869, George Westinghouse patented a steam-driven free piston compressor.

This principle was improved upon by Nikola Tesla in 1894. His design used machined grooves in the piston to let in the steam or air to drive the piston. The main problem with this design is that under a heavy load the stroke will shorten, with the result that the air supply is cut off.

Having studied the various types of reciprocating engines, I decided that apart from trying to follow the third law, certain other essential features were necessary:

1) Floating valves that can slide on the reciprocating shaft, towards and away from each other. This makes it possible to vary the length of the stroke, thereby compensating for heavy loads.

2) A variable inertia system, enabling mass to be added or removed from a moving system. This is used to change the period of the reciprocating engine.

3) Heat exchanger fins. By adding fins to this type of engine, heat can be caused to flow into the engine, thus adding to its efficiency.

By applying the above-mentioned features, a simple and efficient power conversion system is possible.

CONCLUDING REMARKS

Much has been written on the subject of heat engines and their operating principles—so much, in fact, that to the casual reader it would appear that there is little, if any, part of the subject left untouched.

Yet the present-day literature may generally be divided into two classes: the non-technical and the technical. The technical literature is often so severely technical and theoretical as to obscure the underlying practical aspects. The student who is not at home with mathematical gymnastics may well be excused for being worried at an imposing array of formulae which, however beautiful and concise in themselves, possess no interest and serve no useful purpose when they fail to convey their significance.

It is my hope that the given explanations make the underlying concepts of thermodynamics—on which all heat engines work—more understandable and interesting.

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— THE SECRET SUPER-HIGH-MILEAGE REPORT —

A 100-MILES-TO-THE-GALLON, SUPER FUEL-INJECTION SYSTEM

by J. Bruce McBurney

After researching and experimenting into the idea of vaporising carburettors—and the simple idea of heating the fuel to boil it, to obtain fantastic mileage improvements—I came to understand this secret of cracking the gasoline down into smaller hydrocarbons and why it really could yield unbelievable gains. I will try to explain this idea as best I can, but I am a mechanic, not a writer, so please be patient and read all the way through, that this idea can go on to all our benefit.

Our engines burn fuel in a cylinder that generates heat that exerts pressure on a piston, which is connected to a crankshaft that rotates to produce motion power.

The type of fuel used dictates the amount of propulsion (useful energy) and heat (wasted energy) generated. A fuel that explodes generates more propulsion and less heat than a fuel that burns. Describing the two basic types of fuels used in bombs, percussion and incendiary, will help explain this concept.

A percussion explosion will destroy a brick building, but not generate much heat or fire. An example is nitroglycerine, used to extinguish oil fires. The dynamics of the explosion chase the flame-front or heat of the combustion far enough away from the oil without generating more heat. This uses the oxygen completely and pushes the heat away so that the oil doesn't re-ignite.

Percussion explosives have a singular specific boiling point, and the molecular structure of each molecule is identical, causing the fuel to react together and immediately. This is the type of reaction used in any supercarb process. It causes the dynamic motion action which generates greater pressure with much less fuel and generates much less wasted heat. It has been noticed that these systems ran much cooler, even to the extent that Pogue ran a car with no radiator system for an extended time with no engine damage.

Incendiary fuels burn and generate heat slowly, causing a building to catch fire and burn. The flame front is slower, and doesn't cause the dynamic explosion of a percussion fuel. Incendiary fuels are made up molecules of many different sizes, having a wide range of boiling points and a greater variance in molecular structure. These react more slowly in burning in progression as they reach different boiling points. Only vapour burns. Any liquid must become vapour before it burns. This is the process used in today's cars. It causes more heat to be generated and not as much pressure for dynamic motion. This requires more fuel to achieve the motion produced.

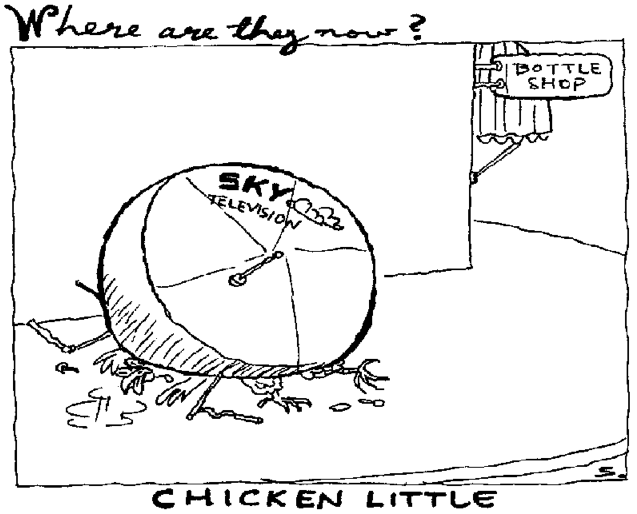
Today's gasoline has a boiling point ranging from 130° to 430° Fahrenheit (or 54° to 221° Celsius). When ignition occurs, the lowest-boiling-temperature fuel burns first and the heat from it is used to boil the next higher boiling-temperature fuels—so that they burn up the chain of higher boiling-points to the point where the piston is pushed down, the exhaust valve opens and the fuel continues burning in the exhaust system.

When applying this understanding to any of the many supercarb systems over the years, there were two basic ways that achieved this percussion-type reaction to power the engine more efficiently. Both basically vaporise the fuel. The first and easiest is fractionalisation, which distils the fuel and burns each level of it. Each level consists of similarly-sized molecules. Vapour systems that recirculate fuel work on this principle. These usually leave the fuel that boils over 400° Fahrenheit unused in the tank.

Thermal Catalytic Cracking (TCC) is the other and is the more efficient of the two. TCC causes the molecular structure of the entire fuel to be changed by breaking the larger multiple carbon molecules into much smaller, singular carbon molecules. The entire fuel is then made up of similar small molecules. Like natural gas, all the molecules now have comparable and much lower boiling points. When it ignites, it burns completely and instantaneously and the energy is transformed more efficiently with a smaller charge. This cracking action uses all the fuel instead of leaving leftover high-boiling-point fuel that normally goes out to the tailpipe or is burnt in catalytic converters. This is fine for reduced pollution, but the wasted heat isn't converted into propulsion power.

What is basically happening with any successful supercarb system is that the fuel is being converted completely into vaporous natural gas and methanol before getting detonated in the engine. There is a distinct advantage to this over the standard system used in today's natural-gas-powered vehicles. That system pre-stores the natural gas in very-high-pressure tanks that cause very large explosions when ruptured. Also, a natural gas system cannot recover waste heat as much, in that TCC is an endothermic reaction. This reaction can take waste heat energy and change it back to chemical energy; specifically, the molecular weight of the water into hydrogen and alcohol as fuel. A water injection system is used to quench the explosion, and the pressure expansion characteristics of steam help to keep the engine running cooler and even more efficiently.

Some previous attempts to produce high-efficiency carburettors used one or both of these processes, but did not run very long. It was not realised by the builders of these vaporising systems that the metal of the vapour chamber itself was acting as a catalyst. These systems soon lost efficiency because additives in gasoline coat the metal of the vapour chamber and prevent the catalytic action from taking place. Since previous inventors didn't realise what was actually taking place, they were continually mystified by their system's apparent failure after a certain amount of running time. Others have been aware of the intricacies of the system for a good many years, but for various reasons have kept quiet about



CHICKEN LITTLE

what they know.

It is interesting to note that lead was not added to gasoline until the time of the Pogue carburettor in the 1930s. Also, understand that to eliminate ping or knock in an engine, you eliminate the larger high-boiling-point diesel fuels. Ping or knock is caused because, under compression, the larger molecules are forced too close to oxygen, causing spontaneous ignition and burning before the top dead centre and spark-plug-firing timing. The smaller the molecule, the greater the octane rating. Natural gas has a rating of about 120.

Now let me give you the short run of the years of frustration I went through with our Patent Office. The following patent is classed as public domain, because just at the time I was publishing my book and filing my patent, the laws were changed. The Patent Office put me on hold due to some regulation, and by the time I was looked after it was too late. I did know the laws and had done as I was supposed to, but the law was changed and that was that. I appealed twice, and my only option was the Supreme Court—and that cost megabucks. I could not afford to chase any more and did not think they would ever patent it, anyway. I was told they did not want it. So here it is; see what you think.

What follows now is a more specific description of the process, taken straight from my patent application. Included is an explanation of my original innovation of a replaceable catalyst container with increased catalyst surface area. This was filed on 3 November 1989.

ABSTRACT

In the conventional carburettor process in the internal combustion engine, a mixture of air and fine gasoline droplets is produced for combustion. In this invention, the gasoline is catalytically converted to small-molecular, light hydrocarbons, methane and methanol, which are then mixed with air for combustion. The new carburation process improves internal combustion engine efficiency and greatly reduces atmospheric pollution.

DISCLOSURE SPECIFICATIONS

This invention relates to a carburation process for the internal combustion engine.

In the internal combustion engine, a mixture of air and fine gasoline droplets is drawn into the cylinders where it is exploded to provide propulsion power. The gasoline droplets are converted to gasoline vapour by the explosion initiating sparks in the cylinders. This conversion is one source of internal combustion inefficiency. The gaseous products of the explosion and the combustion of the gasoline vapour are major contributors to the pollution of the atmosphere.

I have found a process for vaporising the gasoline droplets before they enter the cylinders of the internal combustion engine; for mixing the gasoline vapour with water vapour; and for converting the gasoline and water vapour mixture over a catalyst into a mixture of low-molecular-weight hydrocarbons, methane and methanol. Mixed with air, this low-molecular-weight mix of hydrocarbons, methane and methanol is then drawn into the cylinders where it is exploded to provide motive power more efficiently.

The gaseous products of the explosions, and combustion of the low-molecular-weight hydrocarbons, methane and methanol, are minor contributors to the pollution of the atmosphere.

CLAIMS

The embodiments of the invention, for which an exclusive property or privilege is claimed, is defined as follows:

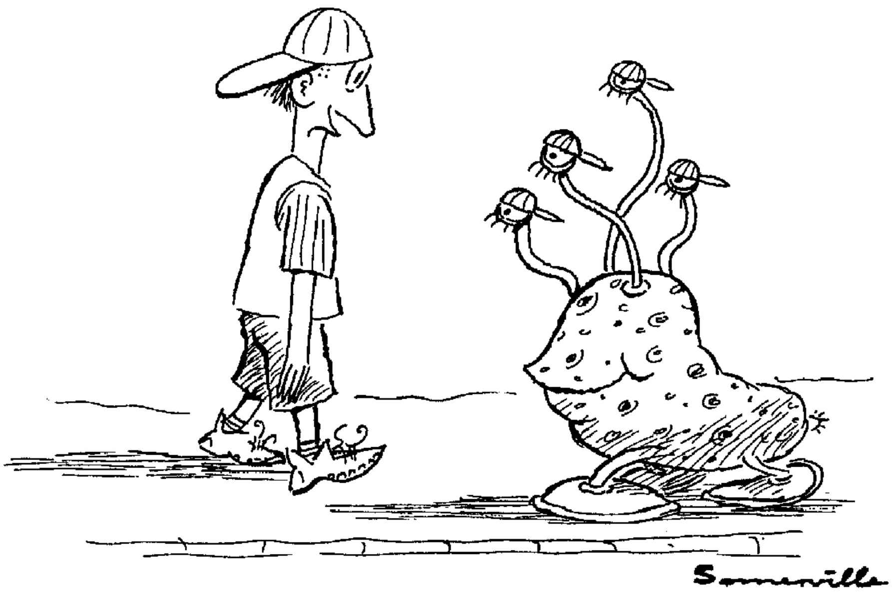
1) The vaporisation of gasoline droplets by waste heat from the exhaust gases of an engine to increase the efficiency with which chemical energy stored in gasoline is converted into propulsion power.

2) The catalytic conversion of a mixture of water and gasoline vapour to small-molecular-weight hydrocarbons, methane and methanol.

3) The combustion in the internal combustion engine of a mixture of air, small-molecular-weight hydrocarbons, methane and methanol, to produce less pollution of the atmospheric environment.

4) A process for generating methane and methanol for use in an internal combustion engine, generated from gasoline and water by passing them over a catalyst heated by exhaust gases.

5) A pre-carburation system consisting of a series of tubings and catalyst bed, heated by exhaust gases to regain this heat energy into further cracking of a liquid hydrocarbon and water into a lighter, more aromatic hydrocarbon and methanol.



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